University of Alberta

The Effect of Bilingual Education on L1 Morphological Knowledge

by

Gregory John Skrypiczajko

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Science

in

Psycholinguistics

Department of Linguistics

Edmonton, Alberta

Fall 1997

National Library of Canada
Acquisitions and Bibliographic Services
395 Wellington Street
Ottawa ON K1A 0N4
Canada

Bibliothèque nationale du Canada
Acquisitions et services bibliographiques
395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file Votre référence

Our file Notre référence

The author has granted a non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of this thesis in microform, paper or electronic formats.

The author retains ownership of the copyright in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de cette thèse sous la forme de microfiche/film, de reproduction sur papier ou sur format électronique.

L'auteur conserve la propriété du droit d'auteur qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

0-612-22674-3

Canada

University of Alberta

Library Release Form

Name of Author: Gregory John Skrypiczajko

Title of Thesis: The Effect of Bilingual Education on L1 Morphological Knowledge

Degree: Master of Science

Year this Degree Granted: 1997

Permission is hereby granted to the University of Alberta Library to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly, or scientific purposes only.

The author reserves all other publication and other rights in association with the copyright in the thesis, and except as hereinbefore provided, neither the thesis nor any substantial portion thereof may be printed or otherwise reproduced in any material form whatever without the author's prior written permission.

4220-109 A Street
Edmonton, AB Canada
T6J 2R8

October 3rd, 1997

University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled The Effects of Bilingual Education on L1 Morphological Knowledge submitted by Gregory John Skrypiczajko in partial fulfillment of the requirements for the degree of Master of Science in Psycholinguistics.

Dr. Gary Libben
(co-supervisor)

Dr. Bruce L. Derwing
(co-supervisor)

Dr. Kyril Holden

Dr. Terry Nadasdi

October 2, 1997
Date

For Auntie Annie
and my Grand Parents.

Abstract

This study addresses the effect of bilingual education on first language metalinguistic morphological knowledge. Performance of bilinguals and monolinguals was compared at three grade levels, based on a background questionnaire. With some variation across tasks, 45 English-Ukrainian bilinguals were compared with 35 English monolinguals in tests of their explicit knowledge of English derivational morphology. Stimuli included 72 English words (48 real words and 24 nonsense items), containing one of twelve English derivational suffixes. Semantic and formal transparency of the word roots were also systematically varied. Subjects were asked to perform four off-line tasks on equal numbers of words in each lexical category: *Word-Breaking* (separate the root and derivational suffix), *Lexical Decision* (judgment of real vs. nonsense word status), *Category Naming* (deciding lexical class of a derived word), and *Root Writing* (writing out the basic root forms). Results show that bilinguals performed significantly better than their counterparts on all tasks.

Acknowledgments

I gratefully thank the many people who have assisted me over the last few years, and those who have guided and educated me through my program with the department of linguistics at the University of Alberta.

During my years in the department, I feel that I have learned much more than was necessary for the completion of this particular investigation. For this I wish to thank my supervisors Dr. Gary Libben and Dr. Bruce Derwing, whose guidance and help will always be appreciated. The feedback and assistance involved with this investigation was only a part of the broad education of linguistics research that I received from the department, however, and so I also wish to acknowledge and thank my other professors: Dr. Anton Roszypal, Dr. Sally Rice, Dr. John Hogan, Dr. Terrance Nearey, Dr. Grace Wiebe, and Dr. Gary Prideaux, who have instructed me through course work, and often provided me with advice and guidance.

Dr. Gary Prideaux, Dr. Lois Stanford, and Dr. John Hogan are particularly acknowledged for the special education and guidance that they provided in the area of discourse analysis. It has been a tremendous benefit to have worked with the Discourse Research Group, with which I received such great exposure to discourse research. I would also like to acknowledge the others involved with the group during those years: Dr. Yuhuan Wong, Dr. Elyse Abraham, Dr. Sara Starsovich, Dr. Satomi Currah, and Marina Blekher.

My sincere thanks also to the Catholic school board of Edmonton, the staff, and students at St. Kevin Jr. High, and Austin O'Brien Sr. High. Without the assistance of these many people, I would not have been able to investigate this hypothesis. I especially thank the participants involved in this study.

I would also like to thank Dr. Kyril Holden and Dr. Terry Nadasdi for their contributions during my defence and final preparations of this thesis.

Sincere thanks also to Diane Kudryk and Mary Daly, whose assistance in many harried situations helped to ensure that deadlines were met.

I would like to once again thank Dr. Gary Libben for the additional education that I have received by being included in the research with the SSHRC funded MCRI Mental Lexicon project. Acknowledgments also go to the student researchers (Martha Gibson, Marina Blekher, Laura Saborin, Debra Eliott, & Patrick Cooper) and co-investigator Dr. Bruce L. Derwing for the fun times, good jokes and support in the research that we had together undertaken.

Finally, I wish to thank Dr. YeoBom Yoon for his camaraderie and sincere encouragement over the years. I look forward to more fun and games at the bowling alley!

Table of Contents

Section	Page
1. Introduction	1
1.1. Background	1
1.2. Choice of Languages	3
1.3. Selection of Stimuli	5
1.3.1. English Language Instruction	5
1.3.2. Ukrainian Language Instruction	6
1.4. Effects of Bilingual Education: Some Pros and Cons	10
1.4.1. The Negative View	10
1.4.2. The Positive View	12
1.5. Research Question	18
1.6. Morphological Competence	22
1.7. Objectives	24
2. The Experiments	25
2.1. Participants	25
2.1.1. The Subject Pool	25
2.1.2. Selection Criteria	26
2.2. Stimuli	26
2.2.1. The Nonsense Stimuli	27
2.2.2. The Real Word Stimuli	27
2.3. Experimental Tasks	29
2.3.1. Task 1: Word Breaking ("Where is the boundary?")	29
2.3.2. Task 2: Lexical Decision ("Is it a Real Word?")	30
2.3.3. Task 3: Category Naming ("What Kind of Word?")	30
2.3.4. Task 4: Root Writing ("What is the Root?")	30
2.4. Procedure	31
3. Scoring, Analysis, and Results	33
3.1. Scoring System	33
3.2. Analysis	33

3.3. Results for Real Words 34
3.3.1. Task 1: Word Breaking 34
3.3.2. Task 2: Lexical Decision 35
3.3.3. Task 3: Category Naming 36
3.3.4. Task 4: Root Writing 37
3.4. Results for Nonsense Items 40
3.5. Some Observations About Excluded Subjects 42
4. General Discussion, Conclusions, and Suggestions for Further Research 43
4.1. Main Findings 43
4.2. Explaining the Bilingual Effect 45
4.3. Summary and Conclusions 48
5. References 49
6. Appendix 57

List of Tables and Figures

Table **Page**

1 Suffixes Employed in All Tasks 27
2 Complete Stimulus Set 29
3 Sample of Answer Sheet and Test Examples 32
4 Overall %Correct on the Four Tasks for Real and Nonsense Items 45

Figure **Page**

1 Results for Real Words on the Word Breaking Task 34
2 Results for Real Words on the Lexical Decision Task 35
3 Results for Real Words on the Category Naming Task 37
4 Results for Real Words on the Root Writing Task 39
5 Results for Nonsense Items on all Tasks 41

Chapter One
Introduction

1.1. Background

Bilingualism, the ability to use two languages effectively in communication, has many practical advantages. As adults, many people may use a second language in the workplace, conducting business in their second language, while using their mother tongue at home with their family. Married couples may have backgrounds of different heritage but speak each other's native language fluently. A child possessing two languages might make the acquaintance of children from other linguistic communities, allowing him or her more social experiences and diversity. The same child may eventually be better suited for high status employment because of the possession of two languages. Bilingualism may even help children to learn more easily in areas unrelated to language, to be more creative in spoken and written expression, or even to become more flexible in analytical activities.

Many researchers claim, however, that bilingual education may hinder, rather than enhance, the cognitive development of children. If it is the case that bilingual immersion programs have negative effects, then such programs might be counterproductive. The critical issue for educators, parents, and researchers alike, then, is whether learning a second language (L2) provides overall benefits for a child's cognitive development. The main concern for bilingual education programs should then be whether the child is acquiring a second language at no expense to the development of the first language (L1), and how to promote cognitive growth and skill in both languages. If bilingual programs impede the natural cognitive development of their students, then such programs should presumably be avoided.

In research in this area, an ongoing battle has developed between the proponents of bilingual education (e.g., Safty, 1988; Genesee, 1983) and

those who believe its effects are detrimental to intellectual development (e.g., Ramirez, 1987; Hammerly, 1989). The outcome to date is that little real progress has been achieved in understanding the cognitive effects that bilingual education programs have on students. Rather than striving to clarify the issues involved, some research programs seem to have continued with hidden agendas and biases, seeking more to confirm preconceived ideas than to address the real empirical issues.

A primary reason for the ongoing reluctance to accept the results of many studies is that the subjective element is often impossible to ignore (see Cummins, 1978a). Another problem with research in this area is a widespread lack of good experimental controls. Only recently have we begun to see well-controlled studies in the area of bilingualism research (cf., Nadasdi, 1995, 1997; King & Nadasdi, 1996; Ellis, 1985; Carroll, Swain & Roberge, 1992). Although the impetus for change toward well-controlled and objective studies in bilingualism has occurred, there is continued need for research that is specific and precisely defined in its methodology and experimental hypotheses, in order to clarify whether the true cognitive effects of bilingualism and bilingual education (and/or immersion) programs are positive or negative, overall.

Another major reason for the lack of agreement between the many investigators in this vast field of research is a lack of consistency in the definition of terms and even the appropriate domains for research. Beebe (1988) recognized this problem when she made the following observation about second language acquisition (SLA):

> Although some scholars have considered SLA to be basically psycholinguistics, I don't see it that way. Rather, I view second language acquisition as the core phenomenon--that is, the linguistic development of the learner in the second language--and I think it can be viewed from multiple interdisciplinary perspectives--psycholinguistics, sociolinguistics, and neurolinguistics (p. 1).

The present study aimed to investigate a small part of second language acquisition. Specifically, it investigates whether bilingual education has an effect on the development of bilingual children's metalinguistic skills with regards to their first language. This is an important research question, since its findings may have significant consequences for the further development of bilingual education curricula and pedagogy. This research aims at some fundamental facts about monolingual and bilingual students' ability to think and process words in their mother tongue, and may therefore have specific implications for curriculum planning and design for both monolingual and bilingual language programs.

Clear experimental hypotheses, along with the careful planning of stimuli and experimental tasks, were expected to help expose differences in metalinguistic knowledge of bilinguals relative to their monolingual counterparts. This study's aim was to provide insight about the way that bilingual students think when dealing with their first language, and to determine whether the L2 learning process has influenced the thinking process on L1 linguistic tasks in any beneficially effective manner. A single specific linguistic feature, namely, English derivational morphology, was considered in development of the study. Furthermore, stimuli were constructed with specific controls for the type of derivational suffixes involved, as well as a balance for semantic and formal characteristics of the stimuli. If a difference with respect to metalinguistic morphological knowledge between these groups is found, then implications for language instruction and curriculum planning will be suggested.

1.2. Choice of Languages.

The Ukrainian and English languages were selected for testing for a number reasons. First of all, these languages share important similarities and thus allow for a much better possibility for transfer or of metalinguistic knowledge than other, more disparate languages. Ukrainian and English are both members of the Indo-European language family, and are described as

being highly conjugated and derivational; moreover, both languages employ suffixation and compounding as the predominant modes of derivational construction. In addition, both languages have many close relatives within their own sub-families (Slavic and Germanic, respectively), allowing for the possibility of future comparative studies.

It was also important for this research that the two languages involved have some significant structural differences, in order that the effects of these differences might be made manifest. In this respect, while both English and Ukrainian are basically inflectional and share a wide range of derivational constructions, there is no question that the Ukrainian inflectional and derivational systems are richer and potentially more demanding of the second language learner (Bilodid 1969, for example lists 94 different suffixes to derive nouns alone, many with multiple allomorphs, though many of these may no longer be productive). It was anticipated, therefore, that the additional attention involved in coming to grips with the more complex Ukrainian system might result in bilingual English-Ukrainian speakers who were more aware of and attuned to morphological processes in general, leading to increased awareness in their first language, English.

In addition to these theoretical reasons for choosing the Ukrainian bilingual program as an appropriate place to recruit subjects, there were also some practical, geographical factors involved. Specifically, Alberta is located in the Canadian prairies and has a large Ukrainian population, and Edmonton, the capital city of the province, has many inhabitants with Ukrainian heritage. One result of this has been the creation of, among others, the Ukrainian bilingual program within the Edmonton Catholic School Board, which has made large groups of English-Ukrainian bilingual subjects available for testing. Since it is important to strive for group homogeneity, it is also beneficial to test both monolinguals and bilinguals who come from the same educational institutions. For these many reasons, Ukrainian second language learners seemed to be well suited for comparison with monolingual speakers of English in this study.

1.3. Selection of Stimuli

In selecting an appropriate set of stimuli for testing the morphological knowledge of our monolingual and bilingual subjects, it was important to have some knowledge of the types of morphological constructions that the students had been exposed to in their classroom instruction.

1.3.1. English Language Instruction

In the process of developing the stimuli, word lists in grades 2 through 8 *Spelling and language arts* textbooks, published by Thomas Nelson & Sons (1968), were studied. Although seemingly outdated, these texts are presently still used by many schools in the Edmonton Catholic school board. This long-term usage is viewed as supporting the validity of the information and educational goals outlined therein. In addition to studying word lists to determine which words students have acquired, it was possible to determine which English affixes are overtly taught at each of the grade levels 2 through 8. The series states the objectives and goals for skill development with English derivations at each grade level. From these statements the amount of attention given to morphology and lexical category-changing suffixes was weighed and estimated.

In a second series consisting of four spellers, entitled *Patterns in Spelling*, published by Laubach Literacy International (1990), educational goals pertaining to the development and acquisition of derivational morphemes were outlined. Although these books do not make clear their intended grade level, the set of four could effectively be used for grades 2 through 7. Category-changing roles of affixes are explicitly taught in all four texts. For instance, Book One contains three lessons which focus on adding the suffix ~ed/~d to verbs, resulting in derived adjectives (e.g., travel+ed = adj. as in the phrase *a well-traveled trail*). From these texts, it could be determined in which order these affixes are taught to students, and which affixes are most commonly studied. This information provided a basis for

the selection of appropriate stimuli for the testing of students' morphological knowledge and abilities.

1.3.2. Ukrainian Language Instruction

In addition to considering the progression of instruction for the English affixes, it is also important to consider the manner of instruction and of the learning involved in the Ukrainian language classes. Since the crux of the experimental hypothesis explored here involved control of subject differences across the monolingual and bilingual subject groups, it was important to understand the manner in which the bilingual subjects studied and learned the morphological characteristics of their second language.

For the purpose of determining the actual style and method of Ukrainian language learning, two lines of enquiry were followed. First, the teachers of the bilingual program were consulted during the testing period. Second, the materials used in classroom exercises for the Ukrainian language arts curriculum were surveyed.

In the teacher interviews, the following questions were asked: (1) Is there an overt focus on the grammatical system of suffixes at the grade 8 (10 and 12) level? (2) Do you think that the students understand the suffix system well? (3) Do you think that they are aware of the suffixes when they are writing and speaking in Ukrainian?

In hindsight, it would have been beneficial to have also asked the teachers whether they thought that the students benefited in their first language usage because of this, and whether they thought that the students were consciously aware of the suffix system when reading. However, this was not done, and those opinions can only be surmised from the results and the answers to the other questions asked in the interviews.

Based on the notes from these interviews, it was determined that the teachers generally had a positive opinion about the students' conscious knowledge of the Ukrainian suffix system. One of the teachers replied, "Sure, they're aware of them; they just don't always get them right." In summary, teachers generally felt that the bilingual students had a high level

of conscious awareness of the basics of Ukrainian morphology, due to a constant focused attention on grammatical elements during language instruction and also during correction reviews of homework exercises.

The second method of enquiry involved the survey and analysis of the current Ukrainian language arts textbook series. The purpose of the survey was to determine the instructional methods for the specific characteristics of the language relevant to this study. In so doing, it was determined that the Edmonton Catholic School Board's Ukrainian bilingual program promotes conscious attention to morphological combinations involving inflectional and derivational suffixes at an very early age. The 'TYT I TAM' ("Here and There") textbook and workbook series is used at the elementary and junior high levels, and the workbooks were examined for the specific types of exercises that they contained. The series focuses first on reading, requiring the children to follow up and display their reading comprehension by completing a variety of exercises. Moreover, these textbooks are advertised in the *Canadian Institute of Ukrainian Studies Press Publications Catalogue*, each level encompassing a certain number of words, including their derivatives. It is important to recognize that this type of overt and focused instruction begins at the grade one level.

The nature of the workbooks is such that in addition to checking reading comprehension, they teach grammatical structures both overtly and indirectly, allowing for conscious and subconscious learning experiences. In other words, there is first an exercise which indirectly teaches the proper endings to the students, by requiring them to match words with pictures. It seems as though this type of exercise deals with the more general semantic properties of the words. This exercise is then followed up with another, requiring students to select the appropriate item from a short list of related items. In this task, the student looks at the picture and then chooses which word or phrase is appropriate from a few selections differing only slightly in grammatical characteristics. Again, it is this overt attention to affixes that is of interest, since this type of exercise requires a careful focus on the variations in the word endings. Overt teaching assists students in the

understanding of such factors as formal transparency (i.e., variation in the sound and/or spelling of a root when it appears in derived forms) and how this is involved in the derivational process.

Furthermore, these exercises seem to be of a consistent nature throughout the levels in the workbook series. Since instruction is repetitive, and consistent over the course of their education, the idea that it is important to consider these particular constructions may become well established in the children's minds. It is very likely that children are instructed to look at the word endings when doing these exercises. Such attention to the same patterns may cause a student to focus more strongly or consciously on the grammatical pattern, and this may also have an effect on the students' conscious awareness of similar characteristics of their L1. This type of training might thus strongly influence awareness of the L1 derivation, in addition to the intended goal of advancing derivational knowledge in L2. It is the conscious attention to specific linguistic details and overt nature of instruction of the second language that may be of particular importance to the comparison of monolingual English and English-Ukrainian bilingual students.

To emphasize the similarity between the two languages of interest, and to clarify the instructional methods involved in Ukrainian language instruction, a brief description of the classroom exercises follows.

In terms of overt instruction, there are exercises that have a page set into tabular form, with two columns. The column on the left contains variations of a word, with different suffixes. On the right, cloze passages are presented, in which the student is required to write the correct responses. There are usually fewer word selections than cloze passages, requiring the students to consider each case independently.

Another type of exercise presents a box containing word variations available for selection, followed by an equal number of cloze sentences. Each of the sentences involves the same word; however, the suffix must be in grammatical agreement in order to be correct. The Ukrainian system of declension involves many different cases, as well as important distinctions

for number and gender in nouns and adjectives. In addition, there are many different derivational suffixes involved. At the upper elementary and junior high levels, the students are able to judge from the sentences which ending is appropriate in terms of its lexical category and in agreement with other words in the rest of the sentence. In these exercises involving suffixes, the student must think consciously about many grammatical distinctions, such as case, number, tense, gender, etc., as well as lexical categories (and other more subtle semantic differences) in their decision-making. At the grade 6 or 7 level students are required to do such exercises with as many as five variants of a word. In other words, as many as five different forms of the same word (involving lexical category, number, gender, case, and possible combinations of these grammatical distinctions) may be presented to the student.

Finally, there are also exercises in each of the workbooks which involve the presentation of a grid in which each cell contains three variants of a word. These exercises are used in games where the teacher speaks cloze-type sentences, leaving out the key word. Again, the student must think about which lexical category is appropriate for the sentence invented by the teacher. The student can then determine which of the words is the correct selection for grammatical consistency with the rest of the sentence.

In addition to these workbook exercises, the teachers who were interviewed indicated that oftentimes 'tidbits' of information regarding derivational suffixes are offered during any language arts lesson. Thus it is the case that exposure to new derivations occurs frequently in class, and explanations are regularly provided.

Based on interviews with the instructors, therefore, there seems to be considerably more time spent on instruction of the grammatical endings of words in Ukrainian classes than is allocated to comparable instruction in English classes. It would be surprising if this difference did not have some significant crosslinguistic effects.

1.4. Effects of Bilingual Education: Some Pros and Cons

Though the advantages of bilingualism and a bilingual education are well known and often highly touted in countries, like Canada, which have an official bilingual policy, the literature shows a wide diversity of opinion, with arguments expressed both for and against.

1.4.1. The Negative View

Against the popular opinion that bilingualism is beneficial, there are many researchers who adamantly oppose bilingual education (e.g., Ramirez, 1987; Hammerly, 1989), claiming that the second language learning process is too demanding. These researchers have typically characterized bilingual and immersion education as having an overall negative effect on students, resulting in impaired cognitive development and deficient language capabilities in both of the languages learned. Many of these accounts show obvious biases, however, and often involve claims that are clearly not justified by solid evidence. Jespersen (1922), for instance, made the following a priori claim against the learning of more than one language:

> On the surface [a bilingual seems] just like a native, but he does not really command the fine points of the language.... Secondly, the brain effort required to master the two languages instead of one certainly diminishes the child's power of learning other things which might and ought to be learned. (p. 148)

Hammerly (1989) also disfavors bilingual education, claiming that there are serious problems associated with immersion programs. He states that such programs "not only do not, but cannot produce graduates whose output is grammatical" (p. 578). Similarly, earlier bilingual education studies (Tsushima & Hogan, 1975; Macnamara, 1966), surveyed by Cummins (1978a), also seemed to indicate that bilingual education resulted in a "language handicap", as measured by verbal intelligence tests (p. 863).

However, these studies often exhibited lack of experimental control or were otherwise flawed from an empirical perspective.

Cummins reports on Macnamara's 1966 research as being a relatively well-controlled study, however, adding support to the negative position on bilingualism. Testing subjects on mathematical problems and reading skills in L1 and L2, Macnamara claimed that a bilingual student "pays for his L2 skills by a decrease in L1 skills," and that instruction in a weaker language leads to deficits in subject matter (Cummins, 1978a, p. 864). However, the immersion subjects in this experiment were tested on reading skills in their weaker language, with comparison groups tested in their stronger language. Thus, as Cummins suggests, the results of testing are confounded with the language of instruction (p. 865).

In addition, Cummins clarifies the notion of a "balanced effect" between L1 and L2 by explaining that any time taken away from L1 (which in this case was the subjects' secondary language in the immersion program under investigation) for the purpose of studying subject matter might in itself lead to lower levels of ability in L1. Thus, the fact that time was spent learning a second language does not necessarily indicate that L2 was the cause of the L1 deficits observed.

Many other studies are similarly flawed in methodological detail. A study conducted by Torrance, Gowan, Wu and Aliotti (1970) claimed that bilingual children in upper elementary school were at a disadvantage in terms of mental flexibility due to "interference of associations in bilingualism." However, despite the fact that the study used a very large sample, it did not control the bilingual and monolingual samples for intelligence (IQ). The researchers also neglected to comment on the level of bilingualism attained by the subjects. Furthermore, the account was unclear whether the experimentation was even conducted in the same language for both groups. In any case, there was no clear or logical connection between the experimental hypothesis and the results. It is possible that the Torrance Tests of Creative Thinking, used in the 1970 study, requires a certain level

of bilingualism or IQ in order to yield valid results. If so, the claim that bilingualism has a detrimental effect on creative thinking may be premature.

Other studies have also overlooked degree of bilingualism as an important factor in measuring intelligence. Diaz (1983) revealed that certain early studies assigned immigrant children to language groups on the basis of their last names, ignoring linguistic ability altogether. This raises many questions about subsequent findings that language abilities produced detrimental effects on intelligence scores. Were the subjects new or recent immigrants? How long had they been involved in the immersion program? Unfortunately, these are questions that were not addressed. Clearly the study was shortsighted in determining that bilingualism and intelligence scores are negatively correlated.

Furthermore, it was clear that this study was conducted under the assumption that the assimilation of Hispanic immigrants into American society was the preferred policy. Given this bias in favor of mainstreaming children into the American public school system, the study was rightly criticized by Garcia (1991) as self-serving.

In summary, research to date on the supposed negative effects of bilingual education has failed to make a very convincing case, either because of preconceived biases or lack of control of critical variables, including the levels of bilingualism and cognitive abilities. (For a more detailed discussion of reports of the negative effects of bilingualism on intellectual development, the reader is referred to the surveys by Hakuta, 1986, pp. 14-44, and Romaine, 1995, pp. 108-111).

1.4.2. The Positive View

On the other side of the coin, however, it is quite possible that bilingual education enhances cognitive development, rather than hampering it, helping children to learn more efficiently and to become more cognitively flexible. Certainly, bilingual education requires that language abilities be applied in new circumstances, as the child must adjust to differences between the two languages involved. The mental adjustments that bilingual

children must make in using and choosing between two languages are certainly demanding and may well also lead them to a higher level of metalinguistic awareness. It is not at all unreasonable to think, therefore, that bilingual children might experience both linguistic and general cognitive advantages over their monolingual counterparts, with no necessary shortcomings in other educational areas over the long run.

It is not surprising, therefore, that members of the pro-bilingual camp (e.g., Bialystok, 1987, 1991; Kessler and Quinn,1987) have countered the naysayers with claims of positive evidence in favor of bilingual educational programs. These researchers consistently find the results of bilingual and immersion education to be beneficial, leading to greater intellectual development. More interestingly, these positive studies have also used an impressive variety of different measures as dependent variables.

In a very general study, Leopold (1949) was one of the first researchers to make a strongly positive claim. Leopold observed his daughter every day in her simultaneous acquisition of German and English, and argued that her acquisition of two languages led her to an earlier "separation of sound and meaning," inviting advanced achievement in other areas. Leopold claimed that bilingual subjects who are exposed to two different ways of naming an object are naturally compelled "to pay more attention to the meaning expressed [by a word] than to the word used to express it."

However, caution must be taken in considering this research, too, not only because Leopold's study involved only one subject—his own bilingual daughter—but also because special attention was involved in the education of this particular child. Regardless of this, Leopold's findings sparked interest in others to search out evidence of cognitive benefits that might accrue in bilingual speakers.

Cummins (1978a), for instance, in his study of Canadian Ukrainian-English bilingual programs, found some rather impressive advantages for fluent bilingual speakers, particularly in the area of metalinguistic skills. Bilingual students were matched with monolingual control groups for IQ, SES, sex, age, and school in the early elementary grades (p. 869). One

group of bilinguals had Ukrainian-speaking parents and language training at home, while another group of bilinguals were described by their teachers as non-fluent bilinguals. Cummins found that the fluent bilinguals (FB) were significantly better at analyzing ambiguities in sentence structure than were either the non-fluent bilinguals (NFB) or the monolingual (M) groups (p. 869). This provides evidence that bilingual students may have a greater capacity to analyze both syntactic and semantic aspects of sentences in language processing. (There was no significant difference found between the NFB and M groups.) Cummins (1978a) also reports that the FB group performed better than the M group at the grade three level in a task of class inclusion, which involves semantic and general reasoning.

These results provide support for Cummins' version of the Threshold Hypothesis, which developed out of the need to clarify the conflicting findings of bilingual research:

> The threshold hypothesis proposes that the cognitive and academic effects of bilingualism are mediated by the levels of competence which the bilingual child attains in L1 and L2. Specifically, there may be threshold levels of linguistic competence which a bilingual child must attain both in order to avoid cognitive disadvantages and allow the potentially beneficial aspects of becoming bilingual to influence his cognitive growth (Cummins, 1978a, p. 858).

The threshold hypothesis states that bilingual influences on intellectual growth do not take effect until children reach a certain minimum level of linguistic ability in the second language. Furthermore, the theory involves two distinct levels: one which must be surpassed in order to avoid negative effects, and another higher level which may have to be reached in order for significant cognitive growth to occur.

A second and related theoretical notion developed by Cummins is the Developmental Interdependence Hypothesis, which states that initially high

levels of L1 will allow for the attainment of higher levels in L2 ability. Conversely, if a child is linguistically deprived in his or her first language, then development of high levels of ability in L2 is unlikely (Cummins, 1978a, p. 856).

Clearly, the requirements for advanced linguistic ability in a second language involve both educational and general environmental considerations. If a child is at a low level in L1 and mainstreamed or placed in an immersion program where a great amount of instruction is given in L2, the child is likely be at a disadvantage. Measuring the effects of bilingualism on the cognitive development of such a child is thus bound to be misleading. What Cummins' theory suggests, then, is that the level of the students' L1 and L2 skills must be taken into account if a clear picture of the effects of bilingual education is to be achieved.

Another noteworthy investigation which gave high marks to bilingual education was Bialystok (1987), who found that bilinguals were better than monolinguals on a variety of specific language-related tasks. For one, grade one bilinguals in French immersion were compared with monolinguals in their ability to count the number of monosyllabic, disyllabic, polysyllabic, and double morpheme words in scrambled and intact sentences, with all testing conducted in English. Results showed that there was no difference when monosyllabic words were counted. However, the monolingual children experienced difficulty with the more complex forms, whereas the complexity was no problem for the bilingual children. Bialystok concluded that this result was due to bilinguals' understanding of the criteria determining word identity (p. 135).

In another part of this study, Bialystok also tested subjects on their ability to switch the names for common pairs of objects. Bilingual children were better able to "treat words as variable referents" for pairs such as sun-moon, mother-father, cat-dog, etc. (p. 138). This can be interpreted as greater mental plasticity, again reflecting an advanced understanding of the concept of word. Bialystok claims that the ability to attend to specific parts of language and to process language in specific ways, is an "integral part of

using language for advanced and specialized purposes," and therefore a cognitive asset (p. 138). So, when bilinguals perform better than their monolingual counterparts on tasks which require them to focus on the form or meaning of a word, reassign names of paired objects, etc., within a distracting environment, it means that they are better at applying high levels of selective attention. This, according to Bialystok, is a primary instrument for cognitive performance. The ability to attend to words, their morphological or syllabic boundaries, and other specific characteristics, is, according to Bialystok, a necessary and fundamental part of using language for "advanced and specialized purposes," such as the ability to read complex words (Bialystok, 1987, p. 133; 1991).

Other linguists and language researchers have also claimed that bilingual education and immersion programs produce cognitive benefits in terms of creativity and mental flexibility. Kessler and Quinn (1987), for example, tested sixth grade students enrolled in an enquiry-based science program in which they were taught to formulate scientific hypotheses in problem-solving settings. Subjects were taken from the same two classes and taught by the same teacher. Results showed that, although the monolingual children were superior to bilingual children in reading ability, they were significantly lower in syntactic ability and in quality of hypothesis formation. In fact, the bilingual children generated hypotheses of much higher quality, using complex forms and metaphoric expressions (p. 180). These findings suggest that these bilingual children were not only able to manipulate syntactic constituents of language more easily, but that they *understood* language better, as well.

Regarding creativity, Kessler and Quinn (1987) also employed the aforementioned Torrance Tests of Creative Thinking. In their analysis however, bilingual students outperformed monolinguals, a result that conflicted with the findings of the earlier study conducted by Torrance et al. (1970), who, as noted above, claimed that bilingual children in upper elementary school were disadvantaged in mental flexibility due to "interference of associations." An important difference between these two

studies, however, is that the more recent one was better controlled in terms of criteria for subject selection, as well as supplemented by a better operationalized set of experimental tests.

Another crucial realization—through the heavy mist, as it were—is that the "context of acquisition" must be considered in any study of the cognitive or intellectual consequences of second language acquisition or bilingual education programs (Romaine, 1995, p. 117). Romaine provides a list of crucial factors that are inextricably involved in the second language acquisition process and are thus influential in the outcomes of empirical research. Romaine states that without attention to these factors, "correlations [found] do not allow us to infer cause and effect relationships," since one or more of these variables may be mediating or confounding the results (p. 110). Paraphrased from pp. 107-119 of Romaine's book, the key factors involved are listed as follows: (1) social class of participants and their parents; (2) level of participants' first language proficiency; (3) quality and quantity of parental attention; (4) language of testing; (5) level of balance between participants' L1 and L2; (6) whether the context of testing is additive or subtractive bilingualism; and (7) type of bilingualism.

It should also be noted that "type of bilingualism" is only one component making up the fabric of the "context of acquisition." Romaine lists the following 6 types: (1) one language - one parent; (2) non-dominant home language / one language - one environment; (3) non-dominant home language without community support; (4) double non-dominant home language without community support; (5) non-native parents; and (6) mixed languages (p. 183-85). (Please refer to Romaine, 1995, for further detail.). It is unquestionable that any study of bilingualism should make clear its method for determining similarities or differences between the different types of bilingualism (since no person's experiences are the same). Information must be gathered to clearly define the type of bilingualism that is under study (and whether there are subject differences in this respect),

and this type of bilingualism must also be logically connected to the experimental hypothesis that are being tested.

For instance, the present study aims to determine the influence of conscious or explicit L2 study on subjects' abilities to manipulate off-line (or conscious) morphological tasks in the L1. The bilingual subjects were all approximately equal in terms of parental involvement, length of study, level of balance, level of L1 proficiency, and the type of bilingualism was an additive one. Furthermore, all subjects (English-Ukrainian & English groups) were tested in their mother tongue, which was English.

Although there has been much research into the effects of L1 on the acquisition of an L2, there have been relatively few investigations which have considered the effects of the L2 on the mother tongue in specific linguistic detail. Furthermore, only a scattering of studies have been conducted where the L2 is considered positively in its role of developing L1 knowledge. Kecskes and Papp (1995) used this as a starting point for their research, which investigated the linguistic effects of foreign language learning on the development of selected L1 skills. They discovered that on syntactic measures, bilingual subjects of ages 14 to 16 provided more elaborate sentences in the L1 due to exposure to complex syntactic structures in the L2. They concluded that intensive foreign language study does positively enhance the development of the L1. For Kecskes, et al., only positive results to linguistic investigations would provide a reasonable motive for coordinating L1 and L2 instruction.

1.5. Research Question

So the Great Bilingualism Debate rages on as to whether the effects of bilingualism or bilingual education provide overall deficits or benefits and this very large and important question is not likely to be soon resolved, particularly with so many deep-seated attitudes at stake. This does not mean, however, that progress cannot be made in the meantime on smaller, more specific questions, contributing to one facet of the larger issue and leading eventually (one might hope) to its ultimate resolution in empirical,

rather than emotional, terms. It is to one of these smaller, constituent questions that this thesis is dedicated. Specifically, the main research question at issue here is the following: Does the acquisition of one particular second language (Ukrainian) produce beneficial effects on the acquisition of a particular first language (English), relative to the acquisition of the first language alone? There are several considerations that suggest that this might indeed be the case.

First of all, if a child is exposed to only a single language, there would appear to be less motivation to reflect on the internal workings of that language than if two structural systems are involved. For the monolingual child the premium would seem to be set almost entirely on solving the problem of communication, i.e., the problem of what to say and the circumstances under which to say it, in order to be understood by others (and the reverse for comprehension). And whatever linguistic system is incidentally learned to accomplish this, there would seem to be little motivation to introspect on that system, which would give every appearance of being the one and only "natural" system capable of being used for this purpose. ("If it works, don't fixate on it.")

For the bilingual language learner, however, the situation is quite different. Now there are two systems to be dealt with, each both similar and different to the other in various subtle and not-so-subtle ways. Even before initiating a conversation, the bilingual speaker is immediately faced with the problem of which language (i.e., which of the two now-competing systems) to bring into play. And knowing that it was possible to express oneself appropriately in either of two different ways, it would seem inevitable that some attention would have to be drawn to the details in the way these differences are played out. Thus it would seem that, since alternative structures were now seen to be not only possible but necessary, the bilingual speaker would likely be much more inclined to attend to questions of structure than the monolingual speaker would. And this increased attention would inevitably result, or so it would seem, to an increased metalinguistic awareness, if nothing else.

This is not to say, of course, that monolingual speakers, too, may not sometimes shift the focus of their attention away from the use of language and onto the form and structure of utterances per se. (Witness, for example, the common use of language games like "Pig Latin," which clearly attest to a certain level of metalinguistic awareness, even at a relatively early age.) The issue, then, is one of degree, and from this perspective it would seem that the bilingual has both more opportunity and more motivation to indulge in the kind of conscious, overt linguistic analysis that is familiar to the descriptive linguist.

Moreover, to return to the specific question under examination here, if both the L1 (English here) and L2 (Ukrainian) are relatively rich in a particular structural characteristic (in this case derivational morphology), yet differ dramatically in the specific details (which is obviously the case, with Ukrainian providing an even richer system than the English one), we have all the more reason to suspect that attention will be drawn to the specific differences involved, leading to a higher level of awareness in this area.

It is also important to recognize, however, that none of the above suggestions are a priori true, or otherwise no empirical research would be required to resolve the issue. It is perfectly possible that, at least for many child language learners, exposure to a complex, competing derivational system may lead to conflict and confusion, which, rather than enhancing and strengthening the language acquisition experience, might even damage it, particularly if introduced at the wrong time. Thus, just as many argue that a critical period exists for the acquisition of many aspects of a first language (especially pronunciation), it has also been argued (see Cummins, 1978a) that the early childhood years are critical to the development of orderly thinking and content learning, and that the premature or otherwise ill-timed exposure to a second language can have negative or even debilitating effects in these areas.

Still a third logical possibility, of course, is that bilingualism might yield both positive benefits (including, of course, the availability of a second language and communicative access to its speakers) and negative consequences (such as possible deficits in other cognitive areas) which roughly balance one another out, depending, perhaps, on the particular circumstances involved. That all of these possibilities have to be considered can be clarified, perhaps, by the introduction of a sports analogy, involving more a physical than a mental transfer of skills.

Consider the analogy of a ski racer who carries out his ski training at the same time that he is learning to master a self-defense system such as karate. If there is no transfer of skills across the two training regimens, or if the positive and negative transfers roughly cancel out, the net result for the individual is the acquisition of two useful skills. However, suppose for the sake of argument that the practice of the martial art had an overall bad effect on skiing, say by introducing some habit from high levels of training in making quick, direct, and forceful movements that interfered with the skier's ability to smoothly and gently slide his feet through a slalom course--or if only by reducing the time available for practice on the ski slopes. In either case, for a serious ski racer, the acquisition of the martial art might not be worth the price.

On the other hand, the concurrent practice of the two sports might have a facilitative effect. This may be either implicit (resulting in overall quicker leg movements, better balance, etc.) or explicit (such as added ability to volitionally move one's legs from side to side quickly through a demanding section of gates in a slalom course.) Other possible benefits for a skier, from studying karate, might be an added awareness of the muscles involved in both types of athletic competition, or an enhanced conscious connection of the specific sub-skills involved in both sports. Under any of these conditions, the net result might then be an enhanced level of performance in the primary sport that could not have been achieved through training in that one sport alone. And so it might also be for the bilingual who learns two languages.

So we return to our main research question. The proposed research asks *whether bilingual education provides cognitive and linguistic benefits, and whether acquisition of an L2 leads to greater ability to use the L1 and enhances metalinguistic knowledge for bilinguals, relative to their monolinguals counterparts*. Whether the available intact subject groups will be sufficiently homogeneous to allow us to draw conclusions about this remains to be seen.

1.6. Morphological Competence

Morphological competence with English derived forms involves a number of aspects. First of all, it involves some sense of what is a real or possible English word, as opposed to a non-existent or impossible one. For example, any normal adult native speaker will likely know the word *muscular*, an adjective derived from the noun root *muscle* by the addition of the suffix *~ar*. If any other adjectival suffix were to be used, with this root, the result would likely be immediately recognized by a native speaker as an impossible or ungrammatical form, though its intended meaning might at the same time be clear (cf. the coinage *musculous*, which the author has heard used by a non-native speaker). Thus one component of morphological competence in regards to English derived words is knowledge of whether the derived form is properly constructed, and whether selectional restrictions on suffixes allows it to exist in the English vocabulary. Though implicit, unformalized, and likely incomplete in the mind of the typical, linguistically untrained native speaker, knowledge of which suffixes can attach to which root forms is nonetheless a fundamental part of morphological competence.

Another aspect of native speaker competence with English-derived forms is the ability to recognize the underlying roots of derived words. This is obvious in many straightforward cases, such as the noun *kindness*, where the adjective root *kind* and the nominal suffix *~ness* are maximally transparent. In other cases where the original sound and/or spelling of the root has been to some extent obscured by historical or other sound (or

meaning) changes that have occurred, some uncertainties can, of course, arise (cf. the noun *impediment*, whose root is pronounced and spelled rather differently from its free form *impede*; or the adjective *fabulous*, whose meaning connection with its historical root *fable* has also been obscured; or the verb *baptize*, whose borrowed Greek root does not even exist in modern English as a free form!) The fact that such fuzzy cases exist does not, however, detract from the fact that skill at morphemic analysis, i.e., the ability to divide a word up into its constituent meaningful parts, and especially to determine the root of a derived form, is a fundamental part of native speaker competence.

A related skill, of course, is the ability, again within limits, to determine where the boundary occurs between a root or stem and a derivational affix (e.g., *kind* + *~ness*, where + indicates the boundary point). While the location of such boundaries can also be obscured to some extent by such factors as historical change (as illustrated again by examples like *impediment*), morphological competence also involves the ability to identify the place where the root or stem and a derivational affix meet.

Finally, native speakers also have intuitions about the word category information carried by derivational affixes. In order to know exactly what a derived form means (i.e., to know all the morphological information that is carried in the derived form), one must know what lexical category change the suffix performs on the root. (Thus, since *publicize* is a verb, whereas the root *public* is a noun, the suffix *~ize* must be not only a verb suffix, but it must also perform a verbalizing or verb-forming function on the nouns to which it applies.) Some ambiguities, of course, occur. The suffix *~ent*, for example, is both an adjective-forming and noun-forming suffix, as illustrated by the fact that the word *dependent* can be either an adjective (as in *a dependent clause*) or a noun (as in, *with a dependent*).

In summary, having morphological knowledge of English derived forms means having knowledge about many subtle aspects of the form, meaning, and structure of derived words. This involves not only knowing the individual words and their meanings, but also being able to recognize

the meaningful components of each (i.e., roots and affixes); where these components join together; what lexical categories are represented; and even, at least to some extent, which affixes are appropriate for a given category, or for deriving one category from another. As will be seen in section 2.3 below, the tests that are developed here to assess morphological knowledge, and to compare the competence of monolingual and bilingual speakers, are all explicitly designed to exploit one or more of these specific native speaker skills.

1.7. Objectives

The objectives of the present study are threefold. The primary objective is to determine whether bilingual education has an effect on L1 morphological skills. Students receiving their education in a bilingual setting, taking an equal number of courses in the L1 and the L2, were expected to perform better than L1 monolinguals who were taking all of their courses in the same language.

The second objective was to investigate the effect of formal (i.e., orthographic and/or phonological) and semantic transparency on the ability of monolingual and bilingual subjects to make morphological judgments in their common first language. As outlined in section 2.2.2 below, formal and semantic considerations are important in measuring morphological skills, since variation on these dimensions can obscure morphological relationships and thus increase the difficulty of performing analytical tasks. This in turn allows for the possibility of detecting differences between subjects with strong morphological skills from those with weaker ones

Thirdly, this study aims to differentiate among the specific types of metalinguistic morphological knowledge possessed by the bilingual and monolingual groups. By developing a separate test for each distinct skill, we raise the possibility of learning which skills are most broadly based and which and most subject to individual differences among native speakers with similar educational backgrounds.

In summary, the present investigation was carried out under the hypothesis that positive transfer from studying an L2 is possible, and that a specific focus might help to reveal this effect.

Chapter Two
The Experiments

2. 1. Participants

In order to maintain homogeneity of groups, all participants were volunteers from classes in the Ukrainian bilingual program and the regular program at St. Kevin Jr. High and Austin O'Brien Sr. High of the Edmonton Catholic School Board. Using students from the same institutions increased control for differences in teaching style and academic philosophy. A rough balance in gender was also maintained.

2.1.1. The Participant Pool

The participant pool consisted of six groups of students: three English-Ukrainian bilingual groups, and three monolingual English groups, matched at the 8, 10 and 12 grade levels. Each group consisted of between 14 and 32 students. The age span between paired groups ranged across three distinct levels, to check whether morphological processing abilities varied over this age range.

2.1.2. Selection Criteria

In order to assess individual differences, a background questionnaire was prepared and administered to all subjects. The primary purpose of the questionnaire was to determine the languages known, the length of time each was studied, and the participants' competence in each.

A primary consideration was whether the subjects were native speakers of English. Although most of the students in the Ukrainian bilingual classrooms were native English speakers, having been placed into the program at approximately age 4-6, a few non-native speakers were also enrolled in both the bilingual and monolingual classes.

As defined for the present investigation, the bilingual group consisted of E-U subjects only, i.e., subjects who were functionally competent in both English and Ukrainian (in the sense that they could do exercises in each for

at least 6 years), but whose mother tongue was English. Bilingual subjects were excluded if their mother tongue was Ukrainian, even if they were fluent in both languages, since the focus of the present study was on L2 effects on L1 English skills. Although there was no direct measure of fluency, all of the bilingual subjects had studied in the bilingual program for a minimum of six years.

In order to control for any additional educational differences, questions were asked about the range of the subjects' communicative experiences outside of the classroom setting. Subjects were asked where, when, and with whom they used the second language. This information was used to create participant groups that were as homogeneous as possible.

The number of languages spoken was also controlled. Only E-U (bilingual) and E (monolingual English) subjects were included. All students who indicated that they spoke any additional languages were excluded, with one exception: French was studied by all subjects, as prescribed by the Alberta school boards. Subjects were not excluded for reported extensive parent-child interaction with the second language, but they were excluded if Ukrainian was the only language spoken in the home.

In summary, subjects were classified into two approximately equal groups of E-U bilinguals and E monolinguals, comprised of students from grades 8, 10 and 12, and ranging in number from 76 to 84, depending on the task.

2.2. Stimuli

Four off-line tests were used in this experiment, each utilizing the same 72 stimuli. All but one of the stimuli[1] were bimorphemic words consisting of a real or nonsense root plus one of the twelve English derivational

---

[1] The exception, an oversight, was the trimorphemic word *activity*, which involved two suffixes. In practice, attention was directed towards the final suffix, -ity. In scoring, the root (*act*) and the derived stem (*active*) were both accepted as satisfactory choices for the 'root' (see section 3.3.4 below).

suffixes shown in Table 1 below. Note that noun (N), adjective (Adj), and verb (V) suffixes were equally represented.

Table 1. Suffixes Employed in All Tasks.

N	Adj	V
~er	**~(i)al**	**~ify**
~ment	**~ful**	**~ate**
~ty	**~able**	**~ize**
~ent	**~ous**	**~en**

Frequency was not controlled, and the stimuli included 24 nonsense items.

2.2.1. The Nonsense Stimuli

The 24 nonsense stimuli were constructed by attaching two nonsense roots to each of the twelve derivational suffixes; these stimuli thus varied on the dimension of lexical category (N, Adj, V). Nonsense roots were either monosyllabic or bisyllabic and the resulting constructions all formed possible English words, in the sense that they contained real English suffixes and did not violate any English orthographic constraints.

2.2.2. The Real Word Stimuli

The 48 real words varied on three dimensions. First of all, like the nonsense stimuli, they varied in lexical category. Each suffix was represented by four examples, resulting equal numbers of nouns, adjectives and verbs (16 each).

The real word stimuli also varied on two dimensions of root-suffix transparency. The first of these, semantic transparency, involves the straightforwardness of the connection in meaning between the root in a

derived form and the meaning of the root when it occurs in isolation as a free form. For example, the root *teach* and the derived form *teacher* illustrate high semantic transparency, since a teacher is obviously someone who teaches. However, the derived form *tumbler* (in the sense of 'drinking glass') illustrates low semantic transparency, since the meaning of this word seems to bear little, or no, relation to the verb root, *tumble*. The second dimension of root-suffix transparency, formal transparency, involves differences in the visual and/or sound similarity between the root as it appears in its derived form, and its form when written or pronounced in isolation. For example, the root of the derived noun *employment* does not change in either spelling or pronunciation, when written or pronounced in isolation (*employ*) or within the derived word. With the derived form *impediment*, however, the free form of the root (*impede*) is spelled and pronounced differently from the way it appears within the derived word (*impedi~*).

The three types of lexical category, the two levels of semantic transparency, and two levels of formal transparency, resulted in the 48 real word stimulus set shown in Table 2 below. (The 24 nonsense items are also shown in a separate sub-table.)

Table 2. Complete Stimulus Set

		Semantic Transparency HIGH			LOW		
Phonological Transparency	HIGH	teacher	causal	purify	tumbler	final	testify
		employment	harmful	activate	parchment	awful	fabricate
		novelty	honorable	legalize	casualty	pliable	authorize
		dependent	famous	sharpen	correspondent	amorous	heighten
		messenger	natural	clarify	traitor	essential	modify
	LOW	impediment	pitiful	tabulate	fragment	bashful	sublimate
		penalty	admirable	publicize	twenty	vulnerable	baptize
		resident	numerous	soften	student	fabulous	fasten
Nonsense Words		ratulner	flamunal	tristify	prastler	jesaidinal	shepify
		gastument	blantful	jubate	muldament	poltenful	lopate
		saldity	cranshable	hamundize	klanity	lesuable	gestavize
		loadent	tulpulous	flanden	rieftent	naptilous	sephen

2.3. Experimental Tasks

Four different experimental tasks were employed in this study, each designed to target a specific aspect of morphological knowledge. A description of these tasks follows.

2.3.1. Task 1: Word Breaking ("Where is the boundary?")

On this task, subjects were asked to draw lines through each stimulus item at the point where the suffix was attached to the root, i.e., to identify the location of the morpheme boundary. Verbal instructions suggested that each word consisted of more than one meaningful part, and subjects were asked to divide each item into these parts. The example *kindness* was provided, which was divided as follows: *kind ness*. (Three other examples were also shown, all of which involved suffixes that were not used in the experiment itself. See section 2.4 below.)

This task provides information about subjects' awareness of how words divide into root and affix morphemes, at least to the extent of where one ends and the other begins.

2.3.2. Task 2: Lexical Decision ("Is it a real word?")

On this task, subjects were asked to decide whether a stimulus was a real word, by circling the appropriate response selection (either *YES* or *NO*) for each item. Thus to indicate the real-word status of ***novelty***, the correct response would be to draw a circle around the *'YES'* response selection. Similarly, for the nonsense item ***saldity***, the correct response would be to draw a circle around the *'No'* response.

The main purpose of this task was to determine whether or not a subject knew the words included in the stimulus set. Since the nonsense stimuli all contained real suffixes and were otherwise well-formed orthographically, it is possible that a subject might occasionally mistake such an item as a real word, as well.

2.3.3. Task 3: Category Naming ("What kind of word?")

On this task, subjects were asked to indicate whether a word was a noun, an adjective, or a verb, by drawing a circle around the *N*, *Adj*, or *V* that was presented next to the word on the answer sheet. For instance, for the real-word stimulus item ***computerize***, the correct response would be to draw a circle around the *V*. (Note that the nonsense item ***gestavize*** can also be identified as a verb on the basis of its suffix.)

This task provides information about a subject's knowledge of major lexical categories and, especially in the case of the nonsense stimuli, their awareness of which affixes are associated with these categories.

2.3.4. Task 4: Root Writing ("What is the root?")

On this task, subjects were asked to identify the root of each derived word, by writing the root out in its proper free form. This is reasonably straightforward in the case of a derived word like ***famous***, containing the

root *fame* (whose pronunciation is the same in both words and whose spelling varies only because of the operation of a regular spelling rule), but more difficult in the case of a derived word like *numerous*, which is based on the root *number* (which varies both in pronunciation and spelling between the two words).

The main purpose of this task was to clarify indeterminacies that might not be resolved by means of any of the other three tasks. Thus a subject might know a word like *fabulous* (Task 2), know that it is an adjective (Task 3), and even be able to separate out the *~ous* suffix (Task 1), all without knowing anything about the root from which it is derived. Awareness of this root can, however, be shown by writing out the free form of the root, *fable* (Task 4).

2.4. Procedure

All testing was done in the schools. The tests were given to the subjects in a classroom setting, with all students in a group taking the same test simultaneously. All subjects (and teachers) were informed that their participation was completely voluntary, that they could quit at any time, and that their identity would be kept strictly confidential.

The session for each classroom began with a personal introduction and a brief and general explanation of the goals of the research. The experiment was described as a study of the way that people understand and use English words. No mention was made of the experimental hypotheses regarding semantic and formal transparency, the effect of bilingual education, or the relevant theoretical information about morphological complexity. Subjects were told only that their skills with English words were of interest.

Subjects were given a stapled booklet containing the test items and a subject questionnaire. They were asked to complete the questionnaire first, so that they all would be starting the experimental tasks at the same time. At the time of introductions, subjects were asked to have reading material ready, so that in the event of finishing the questionnaires early, there would be no disturbances to other subjects. When all subjects had passed their

questionnaire to the front, there was a brief explanation of the experimental tasks.

The instructions were read aloud to the subjects, while they read along silently, and examples were completed on the blackboard to facilitate comprehension of the tasks. Subjects were asked to work quickly and to avoid going back to questions already answered. The test was explained as including four distinct tasks. In order to allow subjects to focus all of their attention at one word at a time, they were told that they should perform all four tasks for each stimulus item before moving on to the next item.

The layout of the answer sheets is shown in Table 3 below for the four example items. The slashes, circles and handwritten root words that appear in this table were, of course, not included on the actual answer sheet, but are provided here to enhance comprehension by the reader.

Table 3. Sample of Answer Sheet and Test Examples.

English Language Study			
Word Breaking	Is it a real word?	Category Naming	Comes from...
Slash the word between root and suffix.	Circle Yes or No for each word.	Circle your choice for each word.	Write the root word.
kindness	YES NO	N V Adj.	*kind*
suptic	YES NO	N V Adj.	*supt*
greyish	YES NO	N V Adj.	*grey*
historian	YES NO	N V Adj.	*history*

After instructions had been provided and an opportunity given to ask clarifying questions, subjects were given approximately forty minutes to complete the tasks.

Chapter Three
Scoring, Analysis, and Results

3.1. Scoring System

The scoring for the first three tasks (word-breaking, lexical decision, and category naming) was binary, with responses scored as either 1 (correct response) or 0 (incorrect or no response). In order to be scored as correct on the word-breaking task, subjects had to mark a derived word with a slash, clearly and unambiguously separating the suffix from the stem. (Extra slashes, as with the trimorphemic stimulus, *activity*, were ignored.) If the slash was inserted through a letter, rather than between letters, then answers to the other tasks were observed in order to determine whether it was carelessness or uncertainty which provoked such a response. The final task, root writing, was scored differently, and this scoring system will be discussed separately in section 3.3.4 below.

3.2. Analysis

If subjects did not satisfactorily complete the stimulus set for any one task, then they were not included in the analysis for that task. Specifically, subjects were excluded if they responded to less than two-thirds of the items, i.e., if they failed to respond to 24 or more items on a given task. This was done to ensure that subjects had taken the task seriously, and that they had attended to enough of the items to suggest a serious commitment. Subjects were also excluded if they responded incorrectly to 60% or more of the items, indicating that they were careless or did not understand the nature of the task.

The data analysis focused on three main factors: (1) subject group (bilingual vs. monolingual); (2) semantic transparency (high vs. low); and (3) formal transparency (high vs. low). Grade level was ignored in the analyses presented below because a preliminary analysis showed no significant differences. In all analyses of variance, semantic transparency and formal transparency were treated as within-subject factors. Each task

was analyzed separately, since the number participants varied across tasks. Nonsense forms were also analyzed separately from real words, for reasons that are discussed in section 3.5 below.

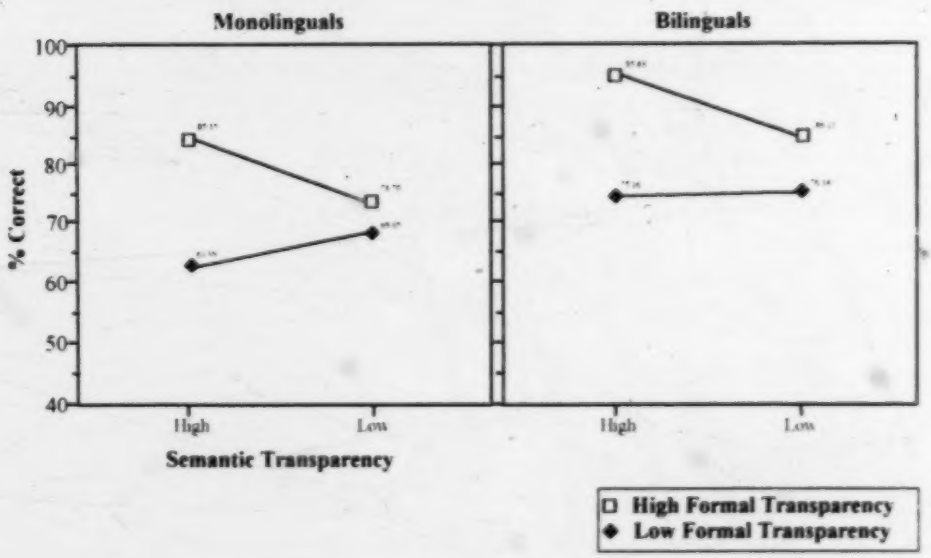
3.3. Results for Real Words

The results for the four tasks are given below:

3.3.1. Task 1: Word-Breaking

There were 79 subjects who satisfied the inclusion criteria for analysis on the word-breaking task. Significant main effects were found for all three factors: subject group [$F(1, 77) = 13.976$, $p = .0004$)], formal transparency [$F(1, 77) = 102.368$, $p < .0001$)], and semantic transparency [$F(1, 77) = 9.951$, $p = .0023$)]. No significant interactions were found.

Figure 1. Results for Real Words on the Word Breaking Task

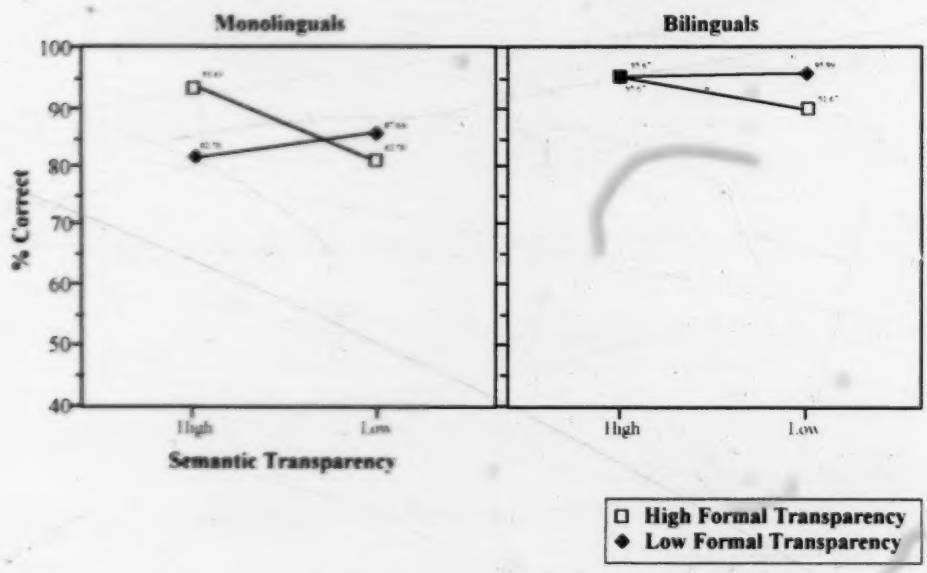


As can be seen in Figure 1 above, monolinguals and bilinguals showed the same basic pattern of response with respect to both semantic and formal transparency, but bilinguals outperformed monolinguals overall.

3.3.2. Task 2: Lexical Decision

There were 85 subjects who satisfied the inclusion criteria for analysis on the lexical decision task. Significant main effects were found for subject group [$F(1, 83) = 11.736$, $p = .001$)] and for semantic transparency [$F(1, 83) = 11.459$, $p = .0011$)], but no significant main effect was found for formal transparency [$F(1, 83) = 0.119$, $p = .7313$)], Significant interactions were found for formal transparency X semantic transparency [$F(1, 83) = 32.321$, $p < .0001$)] and for formal transparency X semantic transparency X subject group [$F(1, 83) = 10.588$, $p = .0016$)].

Figure 2. Results for Real Words on the Lexical Decision Task

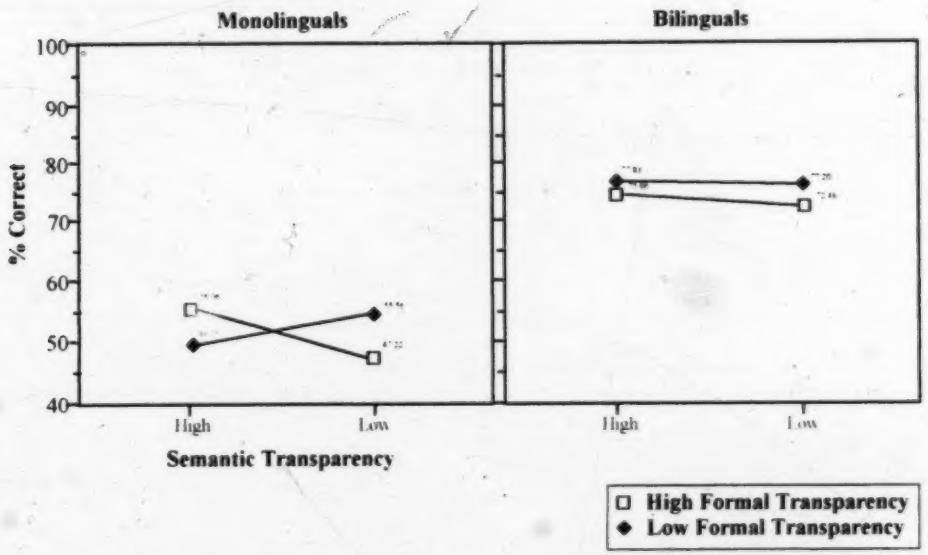


As can be seen from Figure 2, bilinguals again performed better than monolinguals overall, and this difference is especially evident on items with low formal transparency. Only on the easiest items, i.e., those with high transparency on both scales, did the performance of the monolinguals reach the very high levels of that of the bilinguals.

3.3.3. Task 3: Category Naming

There were 86 subjects who satisfied the inclusion criteria for analysis on the category naming task. A significant main effect was again found for subject group [$F(1, 84) = 24.507$, $p < .0001$], as well as a marginally significant main effect for formal transparency [$F(1, 84) = 4.031$, $p = .0479$)]; there was no main effect for semantic transparency [$F(1, 84) = 1.465$, $p = .2295$)]. Interactions were found for formal transparency X semantic transparency [$F(1, 84) = 9.453$, $p = .0028$)], and for formal transparency X semantic transparency X subject group [$F(1, 84) = 5.630$, $p = .0199$)].

Figure 3. Results for Real Words on the Category Naming Task



As can be seen from Figure 3 above, bilinguals performed much better than monolinguals overall. Oddly, on this particular task, performance on items with low formal transparency was slightly higher, overall, than performance on items with high formal transparency, although the monolingual speakers were inconsistent on this point.

3.3.4. Task 4: Root Writing

There were 77 subjects who satisfied the inclusion criteria for analysis on the root writing task.

In the root writing task analysis, three different means of scoring the data were considered. The first and most lenient approach employed a five-way marking scheme, using 0, 1, 2, 3 or 4 for each real word stimulus, allowing subjects to receive partial credit for answers that, though not technically correct, displayed at least some measure of intuitive insight.

Within this scheme, correct answers were assigned a score of 4 (e.g., either the root *act* or the stem *active* in response to the derived noun *activity*), while the other scores were assigned on the basis of the judged closeness of the response to the correct one. Thus a score of 3 was given for answers which involved only a small and likely accidental spelling error (e.g., *actve* in place of *active*); 2 for supplying other derived forms of the same root or stem (e.g., *activity*) or for other partially correct responses (e.g., *messag* in place of *message*); 1 for responses that at least showed evidence of awareness of the location of the morpheme boundary, as when merely copying the non-suffix part of the stimulus (e.g., *activ* in response to *activate*); and 0 for responses that were judged to be completely wrong (e.g., *acne* in place of *act* or *active*), which involved merely copying the original stimulus (e.g., *activity*), or which were left blank

In this same scheme, the responses to the nonsense words were given scores of 0, 1 or 2, again depending on how close they were to the correct response, which was taken to be any plausible nonsense form. Thus a score of 2 was given for both *trist* and *triste*, in response to the stimulus *tristify*; 1 for responses that were completely off-base but at least preserved the boundary-point information (e.g., *gestile* or *gestat* in response to the stimulus *gestavize*); and a 0 for all other responses, including no response.

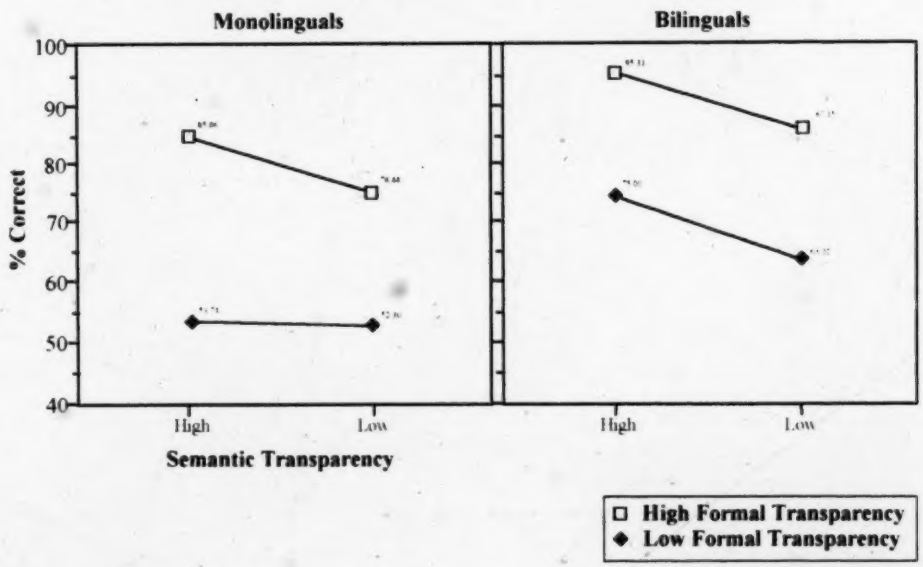
A second, much more stringent scoring scheme was also considered, which scored all responses as either 1 (completely correct) or 0 (incorrect, for all other responses). These scores could be readily derived from the lenient scheme above by merely converting the highest score (4 for real words and 3 for the nonsense items) to 1 and all other scores to 0. This was the scheme ultimately adopted for the nonsense stems.

Finally, a third scheme was developed for scoring items that represented a compromise between the above two extremes. Under this scheme, a three-way distinction was made for responses to the real words, where 2 was assigned to completely correct responses, 1 for responses that at least conveyed awareness of the location of the root-affix boundary, and 0 for all other responses, including no response. In the end, this third scheme

was selected as the most reasonable and reliable, and this is the one that is reflected in the analysis below for the real words.

Based on the means calculated from this compromise 3-way scheme, the responses for the real words on root writing task showed much the same pattern as in all three of the other tasks, with significant effects found for all three main variables: subject group [$F(1, 75) = 21.12$, $p < .0001$)], formal transparency [$F(1, 75) = 335.275$, $p < .0001$)], and semantic transparency [$F(1, 75) = 29.26$, $p < .0001$)]. No interaction was found for formal transparency X semantic transparency [$F(1, 75) = 0.439$, $p = .5096$)]; however, there was a formal transparency X semantic transparency X subject group interaction [$F(1, 75) = 4.696$, $p = .0334$)].

Figure 4. Results for Real Words on the Root Writing Task



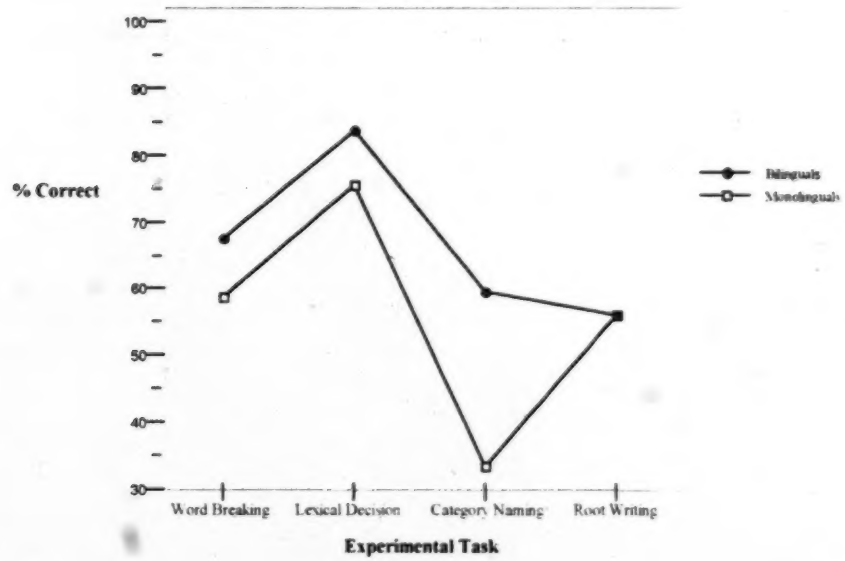
This response pattern can be seen in Figure 4, where bilinguals again outperformed monolinguals overall, high formal transparency items were easier than low formal transparency items, and, in general, high semantic transparency items were easier than low semantic transparency items. The exception to this overall pattern is the performance of the monolingual subjects on items of low formal transparency, where differences in semantic transparency seem to have had no effect.

3.4. Results for Nonsense Items

As already indicated, the experiments included 24 items that were created by adding one of the 12 real English suffixes to nonsense roots. These items were analyzed separately, since they were all opaque semantically, and because there were no real roots against which to make judgments of formal transparency. Thus only the main effect of subject group was relevant here. Figure 5 shows the response levels for both subject groups on each of the four tasks.

No significant main effect was found for the nonsense items on tasks 1, 2, and 4: word-breaking [$F(1, 73) = 1.499$, $p = .2248$)], lexical decision [$F(1, 79) = 2.462$, $p = .1206$)], and root writing [$F(1, 71) = 0.061$, $p = .8061$)]; however, a significant difference was found between the two subject groups on task 3, which was the category naming task [$F(1, 80) = 18.009$, $p < .0001$)]. In other words, it was only the category naming task that revealed differences between the monolingual and bilingual subjects, with the bilinguals performing much better on this task.

Figure 5. Results for Nonsense Items on all Experimental Tasks



In general, regardless of task, all subjects seemed to have more difficulty with the nonsense items than with the real words. This is not surprising, however, given the fact that only the suffixes conveyed any meaningful information for these items. Thus in word-breaking, only the form of the suffix provided any clues as to the appropriate boundary point for nonsense items, whereas both the root and the suffix did so for real words. In category naming, too, the only clue to lexical category came from the suffix, whereas real-word decisions could be made on the basis of the meaning of the whole word. In root writing, similarly, only a strategy of affix-stripping would seem to be efficacious, since the roots themselves were meaningless, unlike the situation with the real words. Finally, even in

the case of lexical decision, a very different decision-making mechanism seemed to be at work: with real words, the task involved straightforward recognition, while with nonsense items a plausibility factor also had to be taken into consideration, which may sometimes have led to false positive identifications.

3.5. Some Observations about Excluded Subjects

As indicated in section 2.1.2, some bilingual subjects (nearly 50% of those actually tested) were excluded from the analyses, because of factors that came to fact from the background questionnaires. Nonnative speakers of English were obviously excluded, since the main goal of the study was to assess the effects of L2 learning on native L1 performance, and English was taken to be the L1 under investigation here. It should not go unmentioned, however, that although English was a second language for this particular subset of excluded subjects, the individuals involved typically performed at a very high level on the English language tests, with scores that were consistently above the 80th percentile on all tasks. Had these subjects been included in the analyses, therefore, the advantage displayed by the bilingual group in comparison with the monolingual group would have been even larger than it was.

There were also several multilingual subjects, including both native English speakers and native speakers of one or more additional Slavic or other languages, who were also excluded from the analysis in order to eliminate multilingualism as a contaminating factor. Once again, however, many of these excluded subjects also performed at a very high level on all tasks and likely would have skewed the results to the further disadvantage of the monolingual speakers.

Chapter 4
General Discussion, Conclusions, and Suggestions for Further Research

4.1. Main Findings

As outlined in section 1.6, the primary objective of this investigation was to see if the bilingual experience provided significant advantages in terms of metalinguistic awareness of L1 morphological structure. On the face of it, the answer would seem to be in the affirmative, as the bilingual group outperformed the monolinguals on all four of the experimental tasks for the real word stimuli, and were also much more successful than the monolinguals on the category naming task for the nonsense items. The monolinguals, on the other hand, failed to outperform the bilinguals on any task. Indeed, it is tempting in the face of this evidence to draw the conclusion that it was bilingualism per se that was responsible for these differences.

One disquieting fact, however, is the result on the lexical decision task with the real words. The fact that the bilingual group correctly identified significantly more of these stimuli as familiar words suggests that the typical member of this group had a larger working vocabulary, in English, than the typical monolingual subject did. But how can exposure to a second language, Ukrainian, ever be responsible for a larger vocabulary in the first language, English? While a few relatively weak arguments might be offered to explain this (e.g., bilinguals are naturally more "word conscious" in general and may thus be more inclined to "look up" new or unfamiliar words when they first come across them), it is, regrettably, far more likely that, despite all of the pre-experimental attempts to select subject groups that were as well-balanced as possible, one or more unanticipated, uncontrolled factor may have distinguished the bilingual group and thus contributed, perhaps in a major or even critical way, to their enhanced performance—at least on the lexical decision task and quite possibly on all

of the other tasks, as well. We will address some of these possibilities in detail in section 4.2 below.

The second objective of this study was to assess the effects of real word formal and semantic transparency on the analytical skills of the subjects in both groups. In this respect, too, the results followed more or less as anticipated: either formal or semantic transparency produced significant differences in overall performance on three of the tasks (word-breaking, category naming, and root writing for the former, and word-breaking, lexical decision, and root writing for the latter), while both did on two of these tasks. Notably, the two tasks where both factors consistently entered in (viz., word-breaking and root writing) were also the two that were most explicitly morphological, whereas the other two introduced other factors (i.e., knowledge of syntactic categories in the case of category naming, and simply knowing or recognizing a whole word in the case of lexical decision). Differences on the word-breaking and root writing tasks were, moreover, entirely in the direction that theory would predict: high transparency (on either scale) tended to make the task easier and result in better performance, while low transparency had the opposite effects. The one small exception to this involved an interaction across the subject groups on the root writing task, whereby the monolingual subjects were relatively insensitive to differences in semantic transparency when formal transparency was low. (A likely explanation for this is that many of the monolingual subjects were unable to parse the low formal transparency items as bimorphemic.)

Finally, in comparing performance on the four tasks, in order to assess differences among the four aspects of morphological skill tested, no statistics were done, though the results seemed to fall more or less as expected. Judging by the raw scores, therefore, averaging across transparency levels, the following hierarchy of difficulty is suggested, as laid out in Table 4.

Table 4. Overall %Correct on the Four Tasks for Real and Nonsense Items

Rank	Task	Real Words		Nonsense Items	
		M	B	M	B
1	Lexical Decision	86.6	94.7	75.6	83.8
2	Word-Breaking	73.2	83.2	58.7	67.3
3	Root Writing	66.9	80.1	56.0	56.2
4	Category Naming	52.1	75.6	34.0	59.9

There is nothing very surprising in any of these results. Lexical decision seems easiest and ought to be, as only recognition of the whole word is involved. Word-breaking seems easier than root writing and, again, it ought to be, since finding the break-point between two constituent morphemes ought to be easier than trying to reconstruct the underlying root form, particularly in the face of low levels of semantic and/or formal transparency. Finally, category naming is the most difficult for the very reason that it brings not only syntactic factors into play but also involves a level of abstract knowledge (particularly for nonsense items) of how affixes determine part of speech and which affixes are properly associated with each of the three major lexical categories involved. It is also less than surprising that performance on the nonsense items seems to be consistency lower than on the real words, given the fact that only the affixes provide any real information in the former case. All in all, we can take these findings as a positive indication of the overall validity of the particular morphological tests that were employed in this study.

4.2. Explaining the Bilingual Effect and Suggestions for Future Research

As already indicated above, we have reason to suspect that the superior performance of the bilingual subjects throughout this study may have to be explained by factors other than bilingualism per se (though we can not be

sure about this, of course, until the other factors are better controlled for). What might some of these contaminating factors have been? We can think of several possibilities.

First of all, despite the fact that all subjects were selected from the same two schools, the superior performance of the bilingual subjects on the lexical decision task, which indicates a larger native English vocabulary, strongly suggests that some or many of the members of the bilingual groups may have incurred broader educational or other life experience advantages, beyond their mere exposure to a second language. (This same argument can also be logically extended to the superior performance of the nonnative English and multilingual subjects who were excluded from the analysis, as discussed in section 3.5.). As Nagy (1991) has noted, skilled readers tend to have larger vocabularies, as well as advanced morphological skills. To control for this general educational factor, differences in reading skills, etc., much deeper enquiries into the backgrounds of the subjects tested would be required, including an assessment of vocabulary size and other general verbal skills. (In the same vein, several of the bilingual subjects might have had the advantages of a higher IQ or SES, so some assessment of these factors is also called for.)

Another factor, already anticipated to some extent in section 1.3.2, is a potentially critical difference in the teaching methods that the bilingual subjects were exposed to. We have already established that the methods used in the Ukrainian immersion classes tended to be highly analytical in character and often focused on overt morphological distinctions and grammatical terminology. Since all four of the tests used here tapped overt morphological knowledge or metalinguistic skills, the kind of training that the bilingual students received may have given them the critical advantage over the subjects in the monolingual group, who evidently experienced much less of this kind of analytical training. To eliminate this factor in future studies, not only do the teaching methods themselves need to be better controlled, but new experimental tests are also called for that test for morphological knowledge in a more indirect, covert way. (One possibility is

repetition priming, as illustrated in the early work of Stanners & Forbach, 1974, and Stanners & Jastrzembski, 1975, and which has been widely utilized in more recent years.)

A third alternative explanation may lie in the specifics of the languages involved, especially the L2. In other words, it may not have been mere exposure to a (i.e., any) second language that was decisive here, but rather the fact that the second language, Ukrainian, was one that is especially rich in morphological structure, and hence one that naturally disposed learners to devote more attention to that particular component of the grammar than they might otherwise have done (see section 1.2 above). If so, it would not be surprising to find that this increased focus of attention might readily transfer to the L1, English, as well. To eliminate this explanation, what is called for is a replication of the present study, comparing native English speakers who are monolingual with others who are bilingual in some other language which has a relatively poor morphological system, such as Chinese or Vietnamese, in which word formation is almost entirely limited to noun compounding.

Finally, it is also quite possible that motivational factors were critical here, either on the part of the bilingual students themselves (whose very participation in Ukrainian immersion suggests a certain high level of commitment to language learning) or on the part of their parents (who might have coerced their children not only to enter the bilingual program but likely encouraged them to take advantage of other educational opportunities, as well). Motivation levels of students can be tested both directly (e.g., via questionnaires) and indirectly (e.g., by observation of classroom performances). As for parental influences, it would likely prove useful to look at students in other bilingual programs where parental concerns are not paramount and where student participation is both voluntary and enthusiastic.

4.3. Summary and Conclusions

In this thesis we have attempted to assess the effect of bilingual education in Ukrainian on morphological skill in native speakers of English. We assessed these skills through four different experimental tests, each dedicated to one of the following sub-skills: the ability to distinguish real from made-up words (lexical decision task); to locate the boundary between a root and a derivational suffix in a derived word (word-breaking task); to reconstruct the underlying form of roots in derived words (root writing task); and to identify the lexical category of these words (category naming task). For real words, the bilingual subjects outperformed the monolinguals on all four tasks, and for nonsense words they also did so (by a wide margin) on the category naming task, while the monolinguals failed to outperform the bilinguals on any task. Relative overall performance on the four tasks turned out very much as expected, attesting to the validity of the tests themselves. Generally speaking, the effect of differences in semantic and formal transparency of the experimental stimuli also came out more or less as predicted, with high transparency tending to produce relatively high levels of performance, and with low transparency tending to produce lower levels.

Overall, the main experimental hypotheses were borne out. In the key case of the bilingual effect, however, it was concluded that a number of alternative explanations had to be considered, in addition to the factor of bilingualism itself, and future studies will need to control for all of these factors if a definitive answer is ever to be discovered.

References

Aitchison, J. (1994). Words in the Mind: an Introduction to the Mental Lexicon. (2nd ed.). Oxford/Cambridge: Blackwell Publishers.

Archibald, J. and Libben, G. (1995). Research Perspectives on Second Language Acquisition. Toronto: Copp Clark Ltd.

Bain, B. (1996). Pathways to the peak of Mount Piaget and Vygotsky: speaking and cognizing monolingually and bilingually. Roma: Bulzoni Press.

Beebe, L. M. (Ed.). (1988). Issues in Second Language Acquisition: Multiple Perspectives. New York: Teachers College, Columbia University Newbury House Publishers, (A division of Harper & Row, Publishers, Inc.).

Bialistok, E. (1987). Words as things: development of word concept by bilingual children. Studies in Second Language Acquisition, 9, 133-140.

Bialistok, E. (1988). Levels of bilingualism and levels of linguistic awareness. Developmental Psychology, 24(4), 560-567.

Bilodid, K. (1969). Contemporary Literary Usage of Ukrainian: Morphology
Сучасна Українська Літературна Мова. Морфологія. За загальною редакцією акад. АН УРСП І. К. БІЛОДІДА. Видавництво. Наукова думка. Київ: 1969. (Інститут Мовознавства ім. О. О. Потебні Академії Наук УРСП.). Відповідальний редактор (Responsible editor): Б. М. Русанівський

Brown, T. & Knight, D. F. (1990). Patterns in spelling, Teacher's edition. (Vol. 1-4). Syracuse: Publishing division of Laubach Literacy International.

Carroll, S., Swain, M., and Roberge, Y. (1992). The role of feedback in adult second language acquisition: error correction and morphological generalizations. Applied Psycholinguistics, 13, 173-98

Christensen, L. B. (1980). Experimental Methodology. (second edition ed.). Boston: Allyn and Bacon, Inc.

Cummins, J. (1978a). The cognitive development of children in immersion programs. Canadian modern language review, 34, 855-883.

Cummins, J. (1978b). Metalinguistic development of children in bilingual education programs: Data from Irish and Canadian (Ukrainian-English) programs. In M. Paradis (Ed.), Aspects of bilingualism : Hornbeam Press.

Cummins, J. (1991). Interdependence of first-and second-language proficiency in bilingual children. In E. Bialystok (Ed.), Language processing in bilingual children (pp. 70-89). Cambridge: Cambridge university press.

Derwing, B. L. (1976). Morpheme recognition and the learning of rules for derivational morphology. Canadian Journal of Linguistics (CJL), 21(1), 39-66.

Dewey, J. (1938). Experience and Education. New York: Macmillan Publishing Company.

Diaz, R. M. (1983). Thought and two languages: The impact of bilingualism on cognitive development. Review of Research in Education, 10, 23-54.

Ellis, R. (1985). Sources of variability in interlanguage. Applied Linguistics 6, 118-31.

Ellis, R. (1994). The Study of Second Language Acquisition. Oxford: Oxford University Press.

Garcia, E. (1991). "Hispanic" children: Theoretical empirical and related policy issues, 1991 Linguistic Institute - course material for LINS 211 - Bilingualism in Education . Santa Cruz: University of California.

Genesee, F. (1983). An invited article - Bilingual education of majority-language children: The immersion experiments in review. Applied Psycholinguistics, 4, 1-46.

Geva, E. & Ryan, E.B. (1993). Linguistic and cognitive correlates of academic skills in first and second languages. Language Learning, 43(1), 5-42.

Gurjanov, M., Lukatela, G., Lukatela, K., & Savic, M. (1985). Grammatical Priming of Inflected Nouns by the Gender of Possessive Adjectives. Journal of Experimental Psychology, 11(4), 692-701.

Hakuta, K. (1986). Mirror of Language: The Debate on Bilingualism: Basic book Inc.

Hamers, Josiane F., and Blanc, Michel H. A. (1989). Bilinguality & Bilingualism. Cambridge: Cambridge University Press.

Hammerly, H. (1989). French Immersion (Does it work?) and the development of bilingual proficiency report. Canadian Modern Language Review / revue canadienne des langues vivantes, 45(3), 567-578.

Hartford, B. V., Albert; and Foster, Charles R. (Ed.). (1982). Issues in international bilingual education: The role of the vernacular. New York: Plenum Press.

Hatch, E. M. (1983). Psycholinguistics: A Second Language Perspective. Cambridge: Newbury House Publishers, A Divisdion of Harper and Row, Publishers, Inc.

Katamba, F. (1994). English Words. New york: Routledge.

Kecskes, I., & Papp, T. (1995). The linguistic effect of foreign language learnign on the development of mother tongue skills. In L. Z. M. Margaret Austin Haggstrom, & Joseph A. Wieczorek (Ed.), The Foreign Language Classroom (pp. 165-183). New York/London: Garland Publishers.

Kessler, C. Quinn., M. E. (1987). Language minority children's linguistic and cognitive creativity. Journal of multilingual and multicultural development, 8, 173-186.

King, R. & Nadasdi, T. (1996). Sorting out Morphological Variation in Acadian French: the Importance of the Linguistic Marketplace. Stanford university: Center for the Study of Language and information.

Kuska, A. (1976). Spelling in Language Arts Revised, Teacher's Edition. (2nd ed.). (Vol. 2-8). Don Mills: Thomas Nelson & Sons (Canada) Ltd.

Lado, R. (1957). Linguistics across cultures: Applied linguistics for language teachers. Ann Arbor: University of Michigan Press.

Larsen-Freeman, D. (Ed.). (1980). Discourse analysis in second language research. Rowley: Newbury House Publishers, Inc.

Leopold, W. F. (1949). Speech development of a bilingual child, Vol. 3. Evenston: Northwestern University Press.

Libben, G. (1993). Are Morphological Structures Computed During Word Recognition? Journal of Psycholinguistic Research, 22(5), 535-44.

Libben, G. (1994). Hierarchical Structure and Selectional Restrictions in Morphological Processing. Paper presented at the Canadian Linguistic Association, Calgary, AB.

Libben, G. (In Press). Semantic transparency in the processing of compounds: consequences for representation, processing, and impairment. Language and cognition.

Lukatela, G., Gligorijevic, B., Kostic, A., and Turvey, M. T. (1980). Representation of Inflected Nouns in the Internal Lexicon. memory and Cognition, 8, 415-423.

Lukatela, G., Kostic, A., Todorovic, D., Carello, C., & Turvey, M. T. (1987). Type and number of violations and the grammatical congruency effect in lexical decision. Haskins Laboratories Status Report on Speech Research, SR-89/90, 81-92.

Lukatela, K., Crain, S., & Shankweiler, D. (1987). Sensitivity to inflectional morphology in agrammatism: investigation of a highly-inflected language. Haskins Laboratories Status Report on Speech Research, SR-89/90, 187-198.

Macnamara, J. (1966) Bilingualism and Primary Education. Edinburgh: Edinburgh University Press.

MacKay, D. G. (1978). Derivational Rules and the internal lexicon. Verbal Learning and Verbal Behavior, 17, 61-71.

Manelis, L., & Tharp, D. A. (1977). The processing of affixed words. Memory & Cognition, 5(6), 690-695.

McLaughlin, B. (1987). Theories of Second-Language Learning. London: Edward Arnold, A Division of Hodder & Stoughton.

Moraes, M. (1996). Bilingual education: A dialogue with the Bakhtin circle. Albany: State University of New York Press.

Nadasdi, T. (1995). Subject NP doubling, matching, and minority French. Language Variation and Change, 7, 1-14.

Nadasdi, T. (1997). (Socio-) linguistic Consequences of Language Attrition. Paper presented at the University of Alberta, Dept. of Linguistics, Mar. 3. 1997

Nagy, W. E., Diakidov, I. N., & Anderson, R. C. (1991). The Development of Knowledge of Derivational Suffixes (Technical Report No. 536). Illinois: University of Illinois at Urbana-Champaign.

Potter, M. C., So, K.; Von Eckardt, B.; Feldman, L. B. (1984). Lexical and conceptual representation in beginning and proficient bilinguals. Journal of verbal learning and verbal behavior, 1984, v.23, 1st issue., 23(1). 23-38.

Ramirez, C. M. (1987). Developmental linguistic interdependence and bilingual education: Cummins and beyond. International Journal of the Sociology of Language, 63, 81-98.

Ricciardelli, L. A. (1992). Bilingualism and cognitive development in relation to threshold theory. Journal of psycholinguistic research, 21, 301-316.

Romaine, S. (1995). Bilingualism. (2nd ed.). Oxford/Cambridge: Blackwell Publishers.

Safty, A. (1988). French immersion and the making of a bilingual society: critical review and discussion. Canadian Journal of Education, 13, 243-261.

Sandra, D. and Taft, M. (Ed.). (1994). A special issue of language and cognitive processes: Morphological structure, lexical representation and lexical access. Hove: Lawrence Erlbaum Associates Ltd., Publishers.

Skutnabb-Kangas, T. and Toukomaa, P. (1976). Teaching Migrant Children's Mother Tongue and Learning the Language of the Host Country in the Context of the Socio-Cultural Situation of the Migrant Family. Helsinki: The Finnish National Commision for UNESCO, 1976.

Smith, M. L. (1987). Spelling and Morpheme Recognition: A Methodological Study. Unpublished Master of Science in Psycholinguistics, University of Alberta, Edmonton.

Stanners, R. and Forbach, G. (1974). Repetition and practice effects in a lexical decision task. Memory and Cognition, 2, 2, 337-339.

Stanners, R. and Jastrzembski, J. (1975). Frequency and visual quality in a word-nonword classification task. Journal of Verbal Learning and Verbal Behavior, 14, 3, 259-264.

Stanners, R. and Jastrzembski, J. (1975). Multiple word meanings and lexical search speed. Journal of Verbal Learning and Verbal Behavior, 14, 5, 534-537.

Swain, M. (Ed.). (1972). Bilingual Education: Some experiences in Canada and the United States. Toronto: The Ontario Institute for Studies in Education.

Swain, M. (1976). English-speaking child + early French immersion = bilingual child? Canadian Modern Language Review, 33, 180-197.

Toukomaa, P. and Skutnabb-Kangas, T. (1976).The Intensive Teaching of the Mother Tongue to Migrant Children of Preschool Age and Children in the Lower Level of Comprehensive School. Helsinki: The Finnish National Commision for UNESCO, 1976.

Zobl, H. (1983). Prior Linguistic Knowledge and the conservatism of the Learning Procedure: Grammaticality Judgments of Unilingual and Multilingual Learners. In S. M. G. a. L. Selinker (Ed.), Language Transfer in Language Learning (Revised ed., Vol. 5, pp. 176-196). Amsterdam/Philadelphia: John Benjamins Publishing Company.

Appendix

Participant Questionnaire

Thank you for participating in this language study. For each question, please circle the letter which best describes your personal situation, and fill in the blanks where necessary.

How old are you?

a) 12-13 b) 14-15 c) 16-17 d) 18+

What grade are you in?

a) 8 b) 9 c) 10

How many years have you been using English?

a) 0-5 yrs. b) 6-10 yrs. c) 11-15 yrs. d) 15+ yrs.

* How many years have you been using Ukrainian?

a) 0-5 yrs. c) 6-10 yrs. c) 11-15 yrs. d) 15+ yrs.

* How many other languages have you studied (other than English and Ukrainian)?

a) 1 b) 2 c) 3

Please list:

_____

How many years have you been using the other language(s)?

a) 0-5 yrs. c) 6-10 yrs. c) 11-15 yrs. d) 15+ yrs.

Did you ever study this other language in school?

a) yes b) no

Can you read and write in this language?

a) yes b) no

How many years have you studied in this language?

a) 0-5 yrs. b) 6-10 yrs. c) 11-15 yrs. d) 15+ yrs.

* What is the approximate ratio of English to Ukrainian instruction in school?

a) E50%-U50% b) E75%-U25% c) E25%-U75%

* What is the approximate ratio of English to Ukrainian reading in school work?

a) E50%-U50% b) E75%-U25% c) E25%-U75%

* What is the approximate ratio of English to Ukrainian writing in school work?

a) E50%-U50% b) E75%-U25% c) E25%-U75%

* What is the approximate ratio of English to Ukrainian speaking in class?

a) E50%-U50% b) E75%-U25% c) E25%-U75%

* What is the approximate ratio of English to Ukrainian reading in home work?

a) E50%-U50% b) E75%-U25% c) E25%-U75%

* How many hours each week do you speak Ukrainian with your family?

a) 0 b) 1-3 c) 4-6 d) 7+

How many hours each week do you speak other languages with your family?

a) 0 b) 1-3 c) 4-6 d) 7+

* How old were you when you learned to read in Ukrainian?
a) 3 b) 4 c) 5 d) 6 e) 7-9 f) 10+

How old were you when you learned to read in English?
a) 3 b) 4 c) 5 d) 6 e) 7-9 f) 10+

* How old were you when you learned to write in Ukrainian?
a) 3 b) 4 c) 5 d) 6 e) 7-9 f) 10+

How old were you when you learned to write in English?
a) 3 b) 4 c) 5 d) 6 e) 7-9 f) 10+

* How often do you write in Ukrainian?
a) daily b) weekly c) monthly d) yearly

* How often do you speak Ukrainian with your family?
a) daily b) weekly c) monthly d) yearly e) never

* How often do you speak Ukrainian with other relatives?
a) daily b) weekly c) monthly d) yearly e) never

* How often do you speak Ukrainian outside of class with your friends?
a) daily b) weekly c) monthly d) yearly e) never

* How often do you speak Ukrainian with strangers?
a) daily b) weekly c) monthly d) yearly e) never

* Have you ever gone to church, summer camp or other activity in which Ukrainian was used? Please describe.

_____

_____.

What is the ratio of English usage to the other language in this activity situation? _____.

How many hours do you spend watching TV, listening to the radio, watching movies, using computers (excluding games)?_____

How many hours do you spend watching TV, listening to the radio, watching movies, using computers in Ukrainian or any other language?_____

Do your parents speak English more often than any other language?

a) yes b) no

How many languages do your parents speak?

a) Mother:_____ b) Father:_____

What is your parents' first or best language?

a) Mother:_____ b) Father:_____

What is the first language you ever learned? _____

* These questions appeared only in the version of the questionnaire that was given to the bilingual students. For some of these questions, the monolingual participants were asked similar questions, to determine whether additional second languages were studied.